

Study of the adsorption of a dye on a silica gel derived from the kaolin siliceous by-products

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Abstract. Silica gel is used in several applications, such as air moisture removal, as a treatment agent for effluents. In this study, silica gel was synthesized from Algerian siliceous by-products (sand) collected from Tamazert ore. The prepared and the synthesized silica gels exhibited pore diameters exceeding 17 Å and surface areas up to 477 m²/g, comparable with those described in the literature and commercial silica gel. N₂ adsorption isotherms showed that the silica gels prepared from Algerian sands are mesoporous materials with high adsorption capacities. To understand better their adsorbent properties and applicability on an industrial scale, this gel was tested for methylene blue (MB) absorption. Maximum decolorization rates (up to 80% after a contact time of 180 min) occurred with product synthesized at pH 2. The adsorption mechanism fitted better with a Langmuir model, revealing a monolayer coverage process of MB molecules over the gel surface, and the adsorption kinetics of the dye on these materials is well described by the second order model

Keywords: siliceous by-product, silica gel, capacity, methylene blue, dye absorption